Differentiation and Integrated Management of Tomato Bacterial Speck and Spot

2010 Florida Tomato Institute Naples, FL

Gary Vallad¹, Pamela Roberts², and Jeff Jones³
University of Florida, IFAS
¹Gulf Coast REC, ²Southwest Florida REC, and ³Plant Pathology
1. Pseudomonas epidemic of 2010
2. Bacterial spot & speck management
3. New tools...
Spring 2010:
It was cold outside!
Spring 2010:
It was cold outside!

<table>
<thead>
<tr>
<th>Location</th>
<th>≤ 32°F</th>
<th>≤ 28°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balm</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Ona</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Immokalee</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Homestead</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

* Based on records from FAWN database (http://fawn.ifas.ufl.edu/)
Spring 2010:  
It was cold and wet outside!

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Balm</td>
<td>3.18</td>
<td>6</td>
<td>2.23</td>
<td>5</td>
<td>6.14</td>
<td>7</td>
<td>2.80</td>
<td>5</td>
<td>0.89</td>
</tr>
<tr>
<td>Ona</td>
<td>1.95</td>
<td>4</td>
<td>2.39</td>
<td>2</td>
<td>5.92</td>
<td>6</td>
<td>2.84</td>
<td>3</td>
<td>6.48</td>
</tr>
<tr>
<td>Immokalee</td>
<td>2.08</td>
<td>5</td>
<td>2.68</td>
<td>5</td>
<td>8.62</td>
<td>8</td>
<td>7.21</td>
<td>6</td>
<td>5.01</td>
</tr>
<tr>
<td>Homestead</td>
<td>0.92</td>
<td>4</td>
<td>4.12</td>
<td>4</td>
<td>2.35</td>
<td>4</td>
<td>4.43</td>
<td>5</td>
<td>4.53</td>
</tr>
</tbody>
</table>

* Based on records from FAWN database (http://fawn.ifas.ufl.edu/)
Spring 2010 – Collier Co.

Photo Credit: G. McAvoy
Collier Co. Symptoms:

• Severe foliar lesions;
  - angular with some chlorosis
• Foliar blighting
• Severe stem lesions
  - mostly epidermis
  - resembled late blight
• Severe fruit specking
• Aborted flowers
Manatee Co. Symptoms:
• Moderate foliar lesions;
  - angular with some chlorosis
• Foliar blighting
• Minor stem lesions
  - mostly epidermis
• Some fruit specking
  - even in hot weather
• Symptoms persisted through June & July
Is this really bacterial speck??
Bacterial speck caused by *Pseudomonas syringae* pv. *tomato*
Bacterial spot caused by *Xanthomonas perforans*
Was this truly Bacterial Speck??

- Of 37 suspect *Pseudomonas* strains collected:
  - 36/37 strains were fluorescent on King’s B.
  - All but 6 tested oxidase (+).
Was this truly Bacterial Speck??

- Of 37 suspect *Pseudomonas* strains collected:
  - 36/37 strains were fluorescent on King’s B.
  - All but 6 tested oxidase (+).

***for Pst or Pss usually enough to make a diagnosis***
Was this truly Bacterial Speck??

• Of 37 suspect *Pseudomonas* strains collected:
  – 36/37 strains were fluorescent on King’s B.
  – All but 6 tested oxidase (+).

• Additional tests for levan, pectinase, ice-nucleation, HR, pathogenicity, and FA analysis.
  – *Pseudomonas syringae* pv. *tomato*
  – *Pseudomonas syringae* pv. *syringae*
  – *Pseudomonas viridiflava*
Pseudomonas viridiflava

P. syringae pv. syringae
Diverse group of *Pseudomonas syringae* pv. *tomato* strains.
Diverse group of *Pseudomonas syringae* pv. *tomato* strains.
Both pathogens require high humidity; rain or dew...and are splash dispersed by rain. In general, Xanthomonads like it hot >80°F, whereas Pseudomonads favor the cooler temps <85°F
Bacterial Spot & Speck Management:

- Crop rotation – avoid rotations among Solanaceae
- Sanitation – destroy plant debris and volunteers
- Solanaceous weeds – serve as reservoir
- Avoid field operations when foliage is wet
- Host Resistance??
- Healthy, disease-free transplants
- Both pathogens are seedborne
- Minimize leaf wetness...avoid heavy rains
- Chemical control...
Regardless of control, conducive weather leads to high disease pressure...

Exclusion is the best tactic!!!
Bacterial Spot & Speck Management:

- **Copper**-based fungicides combined with **mancozeb/maneb** (Cu-tolerance)
- Actigard; use lowest rate and begin weekly applications before disease develops (restricts bacterial growth)
- **Streptomycin** sulfate; transplant production
Bacterial Spot & Speck Management:

- **Copper**-based fungicides combined with **mancozeb/maneb** (Cu-tolerance)
- **Actigard**; use lowest rate and begin weekly applications before disease develops (restricts bacterial growth)
- **Streptomycin sulfate**; transplant production
- **Kasugamycin** (no label)
- **Quinoxyfen** (no label)
Streptomycin sulfate

• An aminoglycoside antibiotic
• Labeled for GH transplant production (200 ppm)
• Currently no field label (registrant is pursuing 24c)...working to update residue & efficacy data...Fall 2011??
• Resistance management will be critical
Kasugamycin (Kasumin 2L, Arysta)

- An aminoglycoside antibiotic (no animal/human use)
- Already used abroad...residue tolerances for US imports
- Label in 2011? Quite restrictive; 100ppm (32floz/50gal), 48floz/season.
- May be a better fit in transplant production.
- Resistance management will be critical
In 4 of 6 field trials, Kasumin 2L alone was as effective as the standard copper + mancozeb.

Little advantage mixing Kasumin 2L with other fungicides, including copper + mancozeb.

In 1 out of 3 field trials, alternating Kasumin 2L with copper + mancozeb improved bacterial spot control over either the copper + mancozeb standard or Kasumin 2L alone.
• Quinoxyfen (Quintec, Dow)
• Active ingredient is actually a quinoline antibiotic
• 2ee label for pepper bacterial spot; 6floe/A; 24 floz limit per season.
• Currently no label for tomato (registrant is pursuing).
Spring 2010, Tomato Bacterial Spot Trial

- **RCBD w/ split plot**: 4 reps.
  - Treatment as whole plot factor and variety as sub-plot factor
- **Tomato Varieties**: SecuriTY28, XP-200, and FL47
- **High clearance sprayer**: 90-120 gal/acre, 210 PSI
- **Pest and stage treated**: 1st application was made 22 Days after planting
- **No. of applications and spray interval**: 6 applications; 10, 10, 8, 13, 8, day interval
Spring 2010 Tomato Bacterial Spot Trial

**AUDPC**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>AUDPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintec, 6 fl oz/100 gal (1-6)</td>
<td>b</td>
</tr>
<tr>
<td>Quintec, 12 fl oz/100 gal (1-6)</td>
<td>a</td>
</tr>
<tr>
<td>Quintec, 18 fl oz/100 gal (1-6)</td>
<td>a</td>
</tr>
<tr>
<td>Quintec, 6 fl oz/100 gal (1-6); Surfix 0.025% v/v</td>
<td>b</td>
</tr>
<tr>
<td>Cuprofix Ultra 40D, 3 lb/A (1-6); Penncozeb 75DF, 2 lb/A (1-6)</td>
<td>a</td>
</tr>
<tr>
<td>Non-treated control</td>
<td>a</td>
</tr>
</tbody>
</table>

*P < 0.0001*
Spring 2010 Tomato Bacterial Spot Trial

Treatment x Variety was not significant

P < 0.0001

P = 0.0002
Spring 2010 Tomato Bacterial Spot Trial

Treatment x Variety was not significant. However, SecuriTY28 exhibited 25% less bloom drop than XP-200 & FL47.
Integration is the key to success!
